

**INTRODUCTORY ECOLOGY
BIOLOGY 2210
ENVIRONMENTAL STUDIES 2210**

LAB MANUAL 2009

"If it dies, it's biology; if it blows up, it's chemistry; if it doesn't work, it's physics."

John Wilkes

"The question is not what you look at, but what you see."

Henry David Thoreau

*"...you don't know what you got till it's gone.
They paved paradise and put up a parking lot."*

Joni Mitchell

*"If you don't have time to do it right the first time,
When are you going to have time to do it again?"*

Anonymous

*"Natural selection has, through all its long history, shown a
mighty open-mindedness toward any idea that works."*

Robert Ardrey



Lab Outline

Dates to Remember

Lab topics and Expectations

Lab 1.	22 Sept.	Introduction
Lab 2.	29 Sept.	Terrestrial Sampling <i>Field Trip - be on time; dress appropriately</i>
Lab 3.	06 Oct.	Terrestrial Analysis
Lab 4.	13 Oct.	Aquatic Sampling <i>Field Trip - be on time; dress appropriately</i>
Lab 5.	20 Oct.	Aquatic Analysis <i>Lab 5 exercises will be marked = 1.0%</i>
Tutorial	27 Oct.	<i>Instruction on How to Write a Formal Report</i>
Lab 6.	03 Nov.	Exploring Population Attributes (I): Size <i>Quiz 1 = 5.0%</i> <i>Lab 6 exercises will be marked = 1.0%</i>
Lab 7.	10 Nov.	Exploring Population Attributes (II): Patterns of Distribution <i>Lab 7 exercises will be marked = 1.0%</i>
Deadline	16 Nov.	<i>Formal Report due at 12:00 NOON = 20%</i>
Lab 8.	17 Nov.	Exploring Population Attributes (III): Age Structure <i>Lab 8 exercises will be marked = 1.0%</i>
Lab 9.	24 Nov.	Predators and Prey: Eating and Being Eaten <i>Lab 9 exercises will be marked = 1.0%</i>
Lab 10.	01 Dec.	The Study of Snow <i>Quiz 2 = 5.0%</i> <i>Formal Reports will be returned to you</i>

2009 Lecture Outline

- ▶ Chapter 1 Introduction

 - PART I LIFE AND THE PHYSICAL ENVIRONMENT
 - ▶ Chapter 2 Adaptations to the Physical Environment: Water and Nutrients
 - ▶ Chapter 3 Adaptations to the Physical Environment: Light, Energy, and Heat
 - ▶ Chapter 4 Variations in the Environment: Climate, Water, and Soil
 - ▶ Chapter 5 The Biome Concept in Ecology

 - PART II ORGANISMS
 - ▶ Chapter 6 Evolution and Adaptation
 - ▶ Chapter 7 Life Histories and Evolutionary Fitness
 - ▶ Chapter 8 Sex and Evolution
 - ▶ Chapter 9 Family, Society, and Evolution

 - PART III POPULATIONS
 - ▶ Chapter 10 The Distribution and Spatial Structure of Populations
 - ▶ Chapter 11 Population Growth and Regulation
 - ▶ Chapter 12 Temporal and Spatial Dynamics of Populations
 - ▶ Chapter 13 Population Genetics

 - PART IV SPECIES INTERACTIONS
 - ▶ Chapter 14 Species Interactions
 - ▶ Chapter 15 Dynamics of Consumer-Resource Interactions
 - ▶ Chapter 16 Competition
 - ▶ Chapter 17 Evolution of Species Interactions

 - PART V COMMUNITIES
 - ▶ Chapter 18 Community Structure
 - ▶ Chapter 19 Ecological Succession and Community Development
 - ▶ Chapter 20 Biodiversity
 - ▶ Chapter 21 History, Biogeography, and Biodiversity

 - PART VI ECOSYSTEMS
 - ▶ Chapter 22 Energy in the Ecosystem
 - ▶ Chapter 23 Pathways of Elements in Ecosystems
 - ▶ Chapter 24 Nutrient Regeneration in Terrestrial and Aquatic Ecosystems

 - PART VII ECOLOGICAL APPLICATIONS
 - ▶ Chapter 25 Landscape Ecology
 - ▶ Chapter 26 Biodiversity, Extinction and Conservation
 - ▶ Chapter 27 Economic Development and Global Ecology
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Introduction

Ecology is an old science. It concerns the study of individual species of plants and animals, and assemblages of organisms, interacting with their biotic and abiotic environments. In Ecology 2210, the emphasis has been placed on the concept of the ecosystem as the basic unit within the biosphere and the fundamental idea of the non-cyclical flow of energy and the recycling of materials within ecosystems. Implicit in any ecological study is the interrelatedness of living things.

In this course, we shall explore the biotic components of ecosystems (traditionally the plants and animals) with respect to species adaption to local environments, methods of dispersal, population structure, and interaction at the community level of organization. Additionally, we will examine the interactions of floral and faunal communities with the physical environments in which they occur.

The topics in lab will echo many of those presented in lecture and give you an introduction to some of the techniques by which we can gain knowledge in ecology. It is hoped that by introducing you to the fundamentals of ecology -- whether you are interested in ecology as a profession or simply as a subject of concern -- you will be better prepared to soundly evaluate the many choices which the future holds.

The following excerpt from "Looking Ahead: a Strategy for Ontario" (OMNR Wildlife Working Group 1991) neatly summarizes the concept of an ecosystem:

AN ECOSYSTEM: *is a network of living things (such as plants and animals, including humans) and non-living components of their environment (such as air, soil and water), interacting with each other and with other ecosystems. Most ecosystems are powered by solar energy and bound together through a network of food chains: green plants use solar energy to manufacture organic substances from carbon dioxide in air, from the water, and from nutrients in the soil; plants, in turn, support populations of herbivores which, in turn, provide food for carnivores. And when an organism dies its body is recycled by decomposer organisms such as bacteria and fungi.*

The concept of linkages and interactions in ecosystems can be applied at many levels. The largest is the ecosphere, the thin layer at the surface of the earth in which life is possible. At the other extreme are the interactions in a small pond, in a rotting log, or in a garden. Lying between these extremes are the large regional landscapes, which may include many identifiable ecosystems, all working the same way: driven by finite amounts of sunlight and constantly recycling material and transferring energy in food webs. This is the productive machine that supports the diversity of wildlife in Ontario. Ecosystems are dynamic, constantly changing on local scales, while providing each species with its unique life requirements within a series of progressively larger ecosystems.

Who?

Lectures: Dr. Nanda Kanavillil: nkanavil@lakeheadu.ca

Labs: John Seigel (Jack): Orillia Campus: Room: (TBA) phone: (TBA)
@lakeheadu.ca

What?

Required Text: Ricklefs, R.E. 2008. The Economy of Nature, Sixth Edition. W.H. Freeman and Company, New York NY.

Mark Allocation:

Labs

Formal Scientific Report (due Monday November 16 at 12:00 noon)	20%
Quizzes - 2 x 5% (during Labs 6 and 10)	10%
Lab Exercises - 5 x 1% (marked during Labs 5-9)	5%
	<hr/> 35%

Lectures

Midterm Exam: 1.5 hours (October, 15)	25%
Final Exam: 3 hours (see exam timetable)	40%
	<hr/> 65%

What if I miss a Lab?

If you show a valid doctor's note within one week, you will not be penalized.

If you sleep in or prefer to study for someone else's test, you are in deep doo doo!

For everything in between, use the contact information above.

What's in the Appendix?

Appendix 1	Guidelines for Writing a Formal Scientific Report
Appendix 2	Laboratory Evaluation Form
Appendix 3	Department of Biology Safety Policy
Appendix 4	Biology Careers for the 21 st Century

Where and When?

Lectures: Tuesday and Thursday; room TC0004; 5:30 - 7:00 p.m.

Lab F01 Tuesday; room HP0013; 2:30 - 5:30 p.m.

Where are the fire exits and safety stations?

Proper fire and safety protocol will be discussed in Lab 1. It is your responsibility to maintain the code of student behaviour and act diligently to ensure the safety of others.

Why?

Whether you are a history major, an outdoor recreation specialist, a nature lover or a premed student, we hope you will learn to appreciate the natural world around you in this Introductory Ecology course. You may not be thinking of a career in this field but everyone at one time or another will take a walk “in the bush”, except now you will know a few of the plants you see and which invertebrates are squishing through your toes in the stream and you will know how the studies were done that closed down your favourite fishing spot and how a skinny little mouse can survive -30°C temperatures better than you.

Isn't it important for all of us to know that plants and animals and their surrounding environment all interact together so nothing stands alone? Each have their own special importance in the big picture just as we do in our everyday lives.

All you ever wanted to know about lab marks

Formal Scientific Report (20%)

The Formal Scientific Report will focus on terrestrial communities (Labs 2 and 3). Marks will be based on the format found in “Rules for Writing a Formal Scientific Report” (Appendix 1). The deadline is no later than 12:00 noon on Monday, November 16, 2009. Reports handed in by 4:30 pm on Tuesday will be penalized 20%, by 4:30 pm on Wednesday will be penalized 30%, by 4:30 pm on Thursday will be penalized 40%, and after that there will be a 50% penalty. Serious extenuating circumstances approached through the proper channels (in writing before the deadline) will be considered but **time management is your responsibility**. Please hand reports personally to Dr. Kanavillil.

Quiz 1 (5%)

Quiz 1 is at the beginning of Lab 6 and will be based on the total content of Labs 1-5. This includes pre-lab talks, lab theory, field techniques and identification of field equipment. There are sample questions throughout each lab to help you prepare for the test.

Quiz 2 (5%)

Quiz 2 will be held at the end of Lab 10 and is based on the total content of Labs 6-10. This includes pre-lab talks, guest speakers, films, lab theory and experimental results. There are sample questions throughout each lab to help you to prepare for the test.

Lab Exercises (5%)

Each indoor lab (Labs 5-9) focuses on an accepted ecological concept. Most simulations involve mathematical solutions, therefore a basic calculator is recommended. Labs can be completed within the 3 hour time frame but working in teams or groups is encouraged. **Each lab exercise is worth 1% and will be marked during the lab.**